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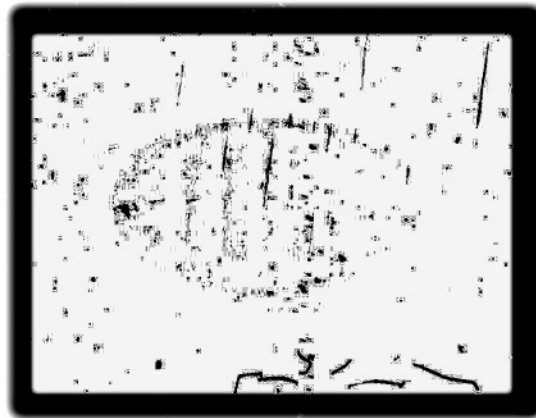
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CONTRACT NObsr-57200

F I L M

D I E L E C T R I C   C A P A C I T O R S

Quarterly Report

Copy #4.

TOBE DEUTSCHMANN CORPORATION

BANFORD, MASS.

**Quarterly Development Report**  
**DEVELOPMENT OF**  
**FILM DIELECTRIC CAPACITORS --- HIGH TEMPERATURE**

**- 0 -**

**This report covers the period January 1, 1954 ... to .... April 1, 1954**

**TOBE DEUTSCHMANN CORPORATION**

**921 Providence Highway  
Norwood, Massachusetts**

**NAVY DEPARTMENT BUREAU OF SHIPS --- ELECTRONICS DIVISION**

Classification cancelled in accordance with  
Executive Order 10501 issued 5 November 1953

*R May 21*  
*9/9/54*

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**Contract No. NObsr-57200**

**Index No. NE-111016, St. 1**

**Date of Contract: Feb. 20, 1952**

**Date of Report: Apr. 15, 1954**

**C M P Classification Class "A" Product**

**Certification DO-A-7 certified under CMP Regulation No. 3**

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~~RESTRICTED~~ABSTRACTPHASE I

All the data gathered on Mylar C Capacitors operated at 125° C. has been analyzed and the results presented in the form of a curve showing the percent of failures to be expected in a 72-hour period in Mylar Capacitors at various stresses.

This curve indicates that these Mylar capacitors can be operated at a stress of 700 volts per mil, at 125° C., and operated for a minimum of 72 hours without exceeding a 3% loss in the test group.

The data gathered at other temperatures is now being analyzed to provide a similar curve for these temperatures.

Indications are that 125° C. may be the top limit, with the present grade of Mylar, except for extremely short-term operations.

Tests to determine this top limit are now underway.

~~RESTRICTED~~ INFORMATION~~RESTRICTED~~



~~R-E-S-T-R-I-C-T-E-D~~A B S T R A C TP H A S E   I I

All the tests during the last quarter on Metallized Mylar have been run to determine the quality of various methods of making contact to the metal film so as to eliminate opens during life test.

The quality of Metallized Mylar capacitors from the point of view of dielectric strength has been proven, and the stress at which these capacitors can operate has been determined.

There remains only the problem of solving the large amount of opens occurring in Life Test.

Two methods are showing good results:

1. Making a small fold in the edge of the dielectric during winding so as to provide a greater area of metallizing to the contact rather than an edge a few microns in thickness.
2. Increasing the margin by a 32nd of an inch, and melting down this margin with a heavy penetrating spray of metal.

Although the results obtained thus far are based on only three groups of capacitors, the results are extremely encouraging.

S-E-C-U-R-I-T-Y     I-N-F-O-R-M-A-T-I-O-N

~~R-E-S-T-R-I-C-T-E-D~~

R-E-S-T-R-I-C-T-E-D

Part I.PURPOSE

A. Develop Film Dielectric Capacitors, high-temperature, utilizing DuPont "Mylar" Film (V-200) or equivalent, as a capacitor dielectric, in order to achieve higher temperature operation and greater reliability of fixed paper capacitors, in accordance with Bureau of Ships Contract Specification SHIPS F-400, dated 15 September 1951, as follows:

B. Phase I.

1. Evaluate a V-200 film or equivalent in accordance with paragraph 3.2.1 of referenced Bureau of Ships Contract Specification SHIPS F-498.
2. Furnish fifty (50) each of various capacitors as described in paragraph 3.2.1 of referenced Bureau of Ships Contract Specification SHIPS F-498.
3. Submit reports as specified therein.

C. Phase II

1. Evaluate a V-200 film or equivalent with metallized electrodes in accordance with paragraph 3.2.2 of referenced Bureau of Ships Contract Specification SHIPS F-499.
2. Furnish fifty (50) each of various capacitors as described in paragraph 3.2.1 of referenced Bureau of Ships Contract Specification SHIPS F-499.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

PURPOSE (continued)

3. Furnish one (1) set of Type D, Class IV Manufacturing Drawings in accordance with Bureau of Ships Specification 16 D19 (RE), dated 15 January 1946, and Amendment No. 2 dated 1 May 1948.
4. Submit reports as specified herein.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

GENERAL FACTUAL DATAPHASE I

It was discovered during Life Tests that Mylar Capacitors tested at 125° C. draw more current than was normally anticipated. To further investigate this phenomenon a series of tests were performed using 1 Mfd. capacitors constructed with two .0005" films of Mylar C between foils.

One test was performed with individual units and another with several units in parallel.

The results in both cases were uniform enough to be incorporated into Curve #C-1017 shown in Part III P. 10-A.

The tests in all instances were performed in the following manner: The units were placed in an oven at 125° C. and allowed sufficient time to stabilize to that temperature. With leads passed through the oven wall to external instruments, the voltage stress was increased in 100 V. D. C. increments to a maximum of 1200 V. D. C. It was found that beyond that stress point, units of such construction break down too rapidly to assure reliable results. At each applied stress voltage, the current was measured in micro amperes. These values were subsequently converted to megohms, and plotted as Insulation Resistance vs. Voltage Stress at 125° C.

S-E-C-U-R-I-T-Y

I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

## R-E-S-T-R-I-C-T-E-D

GENERAL FACTUAL DATA (continued)PHASE I

An analysis of this curve makes it very obvious that Mylar C at 125° C. possesses undesirable characteristics.

At 100 V. D. C., which is the approximate potential applied for insulation resistance measurements, the result is only 22 megohms per microfarad, and the curve slopes steeply so at 1200 V. D. C. the result is a mere 1.5 Megohms per microfarad.

This sharp decline is surprising since paper changes insignificantly with voltage stress.

At any rate, these results do not coincide with the early history of the material. Our first curves showed 400 megohms per microfarad at a potential of 90 V. D. C. It might be that Mylar deteriorates when stored for any length of time, or it may be that one lot of material varies that much from another. In either case, it is an undesirable characteristic.

Characteristic "K", taken from the MIL-C-25A Specification, allows a minimum insulation resistance value of 10 megohms per microfarad at 125° C. Judged on this performance, Mylar C hardly exceeds paper as a dielectric at elevated temperatures.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

GENERAL FACTUAL DATAPHASE II

As mentioned previously, the excessive number of opens that occur during Life Test has been the greatest difficulty encountered with Metallized Mylar.

The bond between the pigtail or terminal connection to the Metallized film on the Mylar has in most cases ruptured during the Life Test. Basing our research on the theory that the heat evolved during the end spray of copper and solder is sufficient to fuse away a fraction of the protective Mylar margin, we have increased this margin from 1/16" to 3/32".

The units referred to in this report were all wound with material having a 3/32" margin.

As a second remedy to this situation, an installation was made on the winding machine whereby a 1/64th of the outer edge of the Mylar was rolled over just previous to being wound.

The capacitors made in this manner have not as yet been exposed to Life Tests and cannot be reported on at this time.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

## R-E-S-T-R-I-C-T-E-D

D-E-T-A-I-LF-A-C-T-U-A-LD-A-T-APHASE I

Work continued, as scheduled, with the 1 Mfd. Capacitor constructed with two layers of .0005" Mylar C film between foils.

The test temperature was 125° C., and the applied Life Test voltages ranged between 600 V. D. C. and 1000 V. D. C. The units were wound with Mylar taken from the same lots as those previously tested and the gauge of the material varied similarly between .00048" and .0006". The winding specification and techniques were the same as those used previously for this type unit.

A. Seventy-five units were divided into three groups of twenty-five each:

1. Tested at 600 V. D. C., two units failed voltage test prior to Life Test. Both were mechanical failures. The remaining twenty-three units were placed on Life Test, and twenty-one completed 72 hours. Both failures were caused by Mylar faults. (See Part III, P. 1.)
2. Tested at 800 V. D. C., three units failed voltage tests prior to Life Test. All three were mechanical failures. The remaining twenty-two units were placed on Life Test and thirteen completed 75 hours. There were eight Mylar failures and one mechanical. (See Part III, P. 2)

S-E-C-U-R-I-T-Y

I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

DETAIL FACTUAL DATAPhase I (continued)

3. Tested at 1000 V. D. C. , two units failed voltage test prior to Life Test. One was a Mylar failure, the other a mechanical. The remaining twenty-three units were placed on Life Test, and eight completed 72 hours.

There were fourteen Mylar failures and one mechanical. (See Part II, P. 3.)

- B. Seventy-five units were divided into three groups of twenty-five each:

1. Tested at 600 V. D. C. , one unit failed voltage test prior to Life Test. It was a mechanical failure.

The remaining twenty-four units were placed on Life Test and twenty-one completed 72 hours.

There were two Mylar failures and one mechanical. (See Part III, P. 4.)

2. Tested at 800 V. D. C. , two units failed voltage test prior to Life Test. Both were mechanical failures. The remaining twenty-three were placed on Life Test, and seventeen completed 72 hours. There were four Mylar failures and two mechanical. (See Part III, P. 5.)

S-E-C-U-R-I-T-Y

I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D



R-E-S-T-R-I-C-T-E-D

DETAIL FACTUAL DATAPHASE I (continued)

3. Tested at 1000 V. D. C., three units failed voltage test prior to Life Test. Two were mechanical failures and one a Mylar failure. The remaining twenty-two units were placed on Life Test, and eleven completed 80 hours. There were ten Mylar failures and one mechanical. (See Part III, p. 6.)

C. Seventy-five units were divided into three groups of twenty-five each.

1. Tested at 700 V. D. C., all units passed the tests prior to Life Test, and twenty-two completed 88 hours. There were two Mylar failures and one mechanical. (See Part III, P. 7.)
2. Tested at 800 V. D. C., all units passed the tests prior to Life Test. All twenty-five units were placed on Life Test and thirteen completed 74 hours. All twelve failures were caused by Mylar faults. (See Part III, P. 8.)
3. Tested at 900 V. D. C., all units passed the tests prior to Life Test. All twenty-five units were placed on Life Test and seven completed 76 hours. All eighteen failures were caused by Mylar faults. (See Part III, P. 9.)

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

DETAIL FACTUAL DATAPHASE II

The tests were performed at 125° C. using the .25 Mfd. capacitors, constructed with a single layer of .0005" Metallized Mylar C as the dielectric. The margins, however, were increased from 1/16" to 3/32".

A. Seventy-five units were divided into three groups of twenty-five each:

1. Tested at 300 V. D. C, all units passed the tests prior to Life Test. All twenty-five units were placed on Life Test and twenty-five completed 260 hours. (See Part III, PP. 12, 13, 14.)
2. Tested at 400 V. D. C., all units passed the tests prior to Life Test. All twenty-five units were placed on Life Test and twenty-five completed 260 hours. (See Part III, pp. 15, 16, 17.)
3. Tested at 500 V. D. C, one unit opened during the initial voltage test. The remaining twenty-four units were placed on Life Test and twenty-four completed 257 hours. (See Part III, pp. 18, 19, 20.)

S-E-C-U-R-I-T-Y

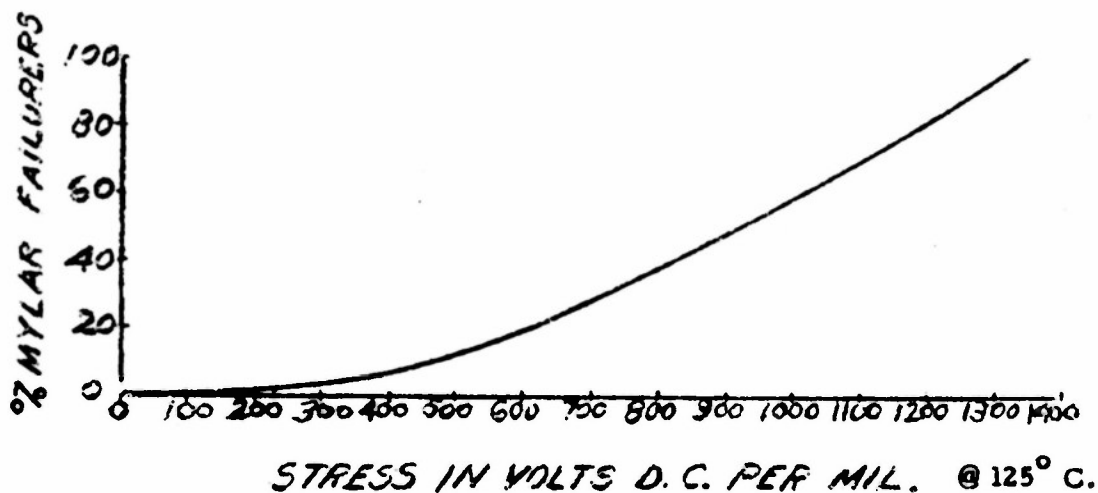
I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

## R-E-S-T-R-I-C-T-E-D

CONCLUSIONSPHASE I

By compiling the results of all the Life Tests conducted at 125° C. (See Part III, P. 10) with the 1 Mfd. Capacitor, constructed with two layers of .0005" Mylar C between foils, it was possible to plot the curve below:



- a) The Curve is derived from plotting the average number of failures in 72 hours of each test voltage group.

A correction was made from the test data to derive the voltage necessary to cause 100% failures in 72 hours. If the test data were plotted directly, that point would be 1500 VDC, but since 100% failures occurred at that voltage in only 41 hours test time, by calculation, it was found that 1360 VDC should be used.

R-E-S-T-R-I-C-T-E-D

CONCLUSIONS (continued)PHASE I

It is our conclusion that a 1 Mfd. capacitor constructed with two layers of .0005" Mylar C between foils will operate for a minimum of 72 hours at a stress of 700 VDC, and at a temperature of 125° C. without exceeding a loss of 30% of the test group.

S-E-C-U-R-I-T-Y

I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

C O N C L U S I O N SPHASE II

With only the results of three groups of test units as a basis, we cannot conclude that the matter of "opens" among Metallized Mylar C units has been solved, but the indications are very encouraging.

Of seventy-five units tested, only one "open" occurred, and that happened before Life Test.

Very rarely, in our previous Life Tests, even at the lower test temperature of 85° C, have any units completed Life Test without any "opens."

These results were gained with test units wound with the margins increased from 1/16" to 3/32". Further tests with similar material will settle this issue.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

P A R T

II

P R O G R A M   F O R   N E X T   I N T E R V A L

R-E-S-T-R-I-C-T-E-D

PROGRAM FOR NEXT INTERVAL

PHASE I

Sufficient test data has been compiled with the 1 Mfd. Capacitor constructed with two layers of .0005" Mylar C between foils at 125° C.

The program for the next quarter will center on units of similar construction, but the test temperature will be raised to 150° C.

Basing our prognosis on the evidence we have found to date, mainly the poor Insulation Resistance of Mylar Capacitors at elevated temperatures, we believe that very few tests will be needed to show conclusively that Mylar C, as we have it on hand, will not serve effectively as a dielectric at 150° C.

S-E-C-U-R-I-T-Y    I-N-F-O-R-M-A-T-I-O-N    R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

PROGRAM FOR NEXT INTERVAL

PHASE II

It is our intent to continue the work with Metallized Mylar C Capacitors, with both increased margins and rolled over edges until it is determined which method yields fewer "opens". If neither of these methods improves the condition, other means will be tried until a satisfactory solution is reached.

It is meaningless to continue testing units which fail mechanically before the stress point of the Mylar C is reached.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N R-E-S-T-R-I-C-T-E-D



**PART**

**III**

# LIFE TEST RECORD

UNIT NO. 1 M.F.O. 2x.5 MIL U Mylar C Capacitor 102 NO. No 657 4129  
 SPECIFICATION Experimental FOR WHOM V. Winick CONTRACT NO. A/6.657-57200  
 MODES ON TEST 72+ TEMPERATURE 125°C VOLTAGE 600 V.D.C.  
 Date started Clock # 7 2073 Date finished Clock # 7 2145  
 22 - December - 53 X - January - 54 Total Hours 72

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage Load P.P. 100K																									
Short R (measured) 100K																									
Cap. in MFD @ 100V 927																									
Power Factor in % .39																									

## LIFE TEST FAILURES IN HRS.

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Short R (measured) 100K																									
Cap. in MFD @ 100V 994																									
Power Factor in % .57																									

Data collected by H.N.J.

# LIFE TEST RECORD

UNITS 1 MPD 2X.5 MIL U  
 SPECIFICATION Experimented  
 HOURS ON TEST 72 +  
 Date started Clock # 8  
 22 - Discharge - 53.  
 FOR WHOM V. Warrall  
 TEMPERATURE 125°C  
 Date finished Clock # 8  
 12 - January - 54  
 VOLTAGE 800 V.D.C.  
 Total Hours 75

LOT NO. 110652 # 130  
 CONTRACT NO. 110652 - 57200

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 800 DC	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Shunt - 75.0 F	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K
Cup	960	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995	995
P.F.	44	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
LIFE TEST FAILURES IN HRS.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt 75.0 F	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K
Cup in 100K/100K	994	994	994	967	974	984	984	1036	1044	1016	995	1016	1016	1016	995	1016	1016	1016	1016	1016	1016	1016	1016	1016	1016
P.F. in %	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	

Page 2.

Data collected by



## LIFE TEST RECORD

UNITS	1 MED 2 x 5 Mil 11

MYLAR-C CAPACITORS

LOT NO. No 652-4 131

**SPECIFICATION**

FOR WHOM  
Victor Winstel

CONTRACT NO. Nosr - 57200

HOURS ON TEST

## TEMPERATURE

VOLTAGE 1000 V.D.C.

Clock #	11	2027	Date finished
---------	----	------	---------------

Clock 11 2109

[illegible]

22-December-53

12-January-54

2 / 2000

## ELECTRICAL TESTS BEFORE LIFE TEST

[illegible]

LIFE TEST  
FAILURES IN HRS.

## ELECTRICAL TESTS AFTER LIFE TEST

[illegible]

3-1-1

**Data collec**

ENGINEERING DEPT. C.I. 1002

**TOBI DEUTSCHMANN CORPORATION**

**WORMWOOD, WASS**



# LIFE TEST RECORD

UNITS 1 NFD. 2x.5 MILU MAYAR C CAPACITORS LOT NO. N0631 = 132  
 SPECIFICATION EXPERIMENTAL FOR WHOM V. H. WIRTH CONTRACT NO. N0631 57200  
 HOURS ON TEST 72.1 TEMPERATURE 125°C VOLTAGE 600 V.D.C.  
 Date started Clock # 7 2449 Date finished Clock # 7 2521  
 10 - February - 54 Tray # 26 - February - 54 Total Hours 72

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 600 V.D.C.	TPC																				TP	PK			TP
Resistance 1000 ohms	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
Capacitance 1000 pF	1000	943	989	962	967	991	953	940	970	974	963	987	984	978	936	987	1018	983	987	958	962	987	948	963	963
Power Factor %	41	31	44	34	38	39	34	31	24	30	30	34	32	36	35	27	34	30	27	37	34	37	32	29	36
LIFE TEST FAILURES IN HRS.	65															61	6								

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Resistance 1000 ohms	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
Capacitance 1000 pF	974	1016	983	999	1027	986	970	974	984	974	1021	1010	1008	934	934	1025	1003	1009	973	994	970	997	994	994	994
Power Factor %	46	44	39	37	47	50	36	40	48	35	35	39	34	34	34	39	34	36	39	35	35	39	39	39	39

Date collected by H. J. V. Bange V. H. W. THOMAS DEUTSCHMANN CORPORATION  
 1002 C. L. 1002



# LIFE TEST RECORD

UNITS 1 MED 2 x 5 MVL U MYLAR C CAPACITORS LOT NO. NUB 31 # 133  
 SPECIFICATION EXPERIMENTAL FOR WHOM V. H. WIRTH CONTRACT NO. NUB 57200  
 HOURS ON TEST 72 TEMPERATURE 12.5°C VOLTAGE 800 V.D.C.  
 Date started Clock # 2352 Date finished Clock # 2424 Total Hours 72  
 10 - February 54 1 - March 54

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 2000 v.D.C.	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Short R.T. 75°F/1000 Hrs																									
Capacitance 800 v.D.C. 934.257																									
Power 800 v.D.C. 37.33																									
LIFE TEST FAILURES IN HRS. 1																									

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Short R.T. 75°F/1000 Hrs																									
Capacitance 800 v.D.C. 934.257																									
Power 800 v.D.C. 37.33																									

Page 5. ENGINEERING DEPT. C.L. 1002  
 Data collected by H. J. V. B. V. H. W. V. H. W. V. H. W.  
 TOBE DEUTSCHMANN CORPORATION  
 NORWOOD, MASS.

# LIFE TEST RECORD

UNITS 1 MED. 2x.5 MILU MYLAR C CAPACITORS LOT NO. 110651 #134  
 SPECIFICATION EXPERIMENTAL FOR WHOM V.H. WINTH CONTRACT NO. 110651 57200  
 HOURS ON TEST 72 TEMPERATURE 125°C VOLTAGE 1000 V.D.C.  
 Date started 10-February-54 Clock # 11 2826 Date finished 26-February-54 Clock # 11 2466 Total Hours 80  
10-February-54 Tray # -

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 1000 V.D.C.																									
Capacitance at 75°F																									
Capacitance at 1000 Hz																									
Power Factor %																									
LIFE TEST FAILURES IN HRS.	4			4	8			8	4							31	4			29					

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Capacitance at 75°F																									
Capacitance at 1000 Hz																									
Power Factor %																									



# LIFE TEST RECORD

UNITS 1 MED 2 x .5 MILU MYLAR CAPACITORS LOT NO. N063r # 135  
 SPECIFICATION EXPERIMENTAL FOR WHOM V. H. WINGRATH CONTRACT NO. N063r 57200  
 HOURS ON TEST 72+ TEMPERATURE 125°C VOLTAGE 700 V.D.C.  
 Date started Clock # 7 25 21 Date finished Clock # 7 26 09 Total Hours 88  
 15 March - 54 29 March - 54

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 700 V.D.C. PL																									XP
Sound R 23 71°F																									
Capac. at 100%	6.95	1.01	923	943	959	1.003	998	934	977	926	979	951	968	954	956	972	936	968	948	997	981	972	975	974	956
Power Factor %	38	41	39	35	44	43	39	38	44	38	39	38	39	42	38	44	38	40	36	37	75	36	37	36	32

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Sound R 23 71°F																									
Capacitance at 100% 1.04	962	963	916	1.02	998	974	1.02	973	947	992	986	1.005	1.011	1.00	982	982	982	982	982	982	982	982	982	982	982
Power Factor %	37	40	3	45	39	44	38	39	43	40	36	38	37	44	38	37	42	45	37	30	30	30	30	30	30

Data collected by V. H. Wingrath, V. H. W.

TOME DEUTSCHMANN CORPORATION

RESEARCH DEPT. C.L. 1002

BROOKLYN, N.Y.



# LIFE TEST RECORD

UNITS 1 MFD 2x.5 MALL MYLAR C CAPACITORS LOT NO. 40658-136  
 SPECIFICATION - EXPERIMENTAL FOR WHOM V.H. WURTH CONTRACT NO. 40658-57200  
 HOURS ON TEST 72 TEMPERATURE 125°C VOLTAGE 840 V.D.C.  
 Date started Clock # 2424 Date finished Clock # 8 Tray # 74  
 15- March 54 29- March 54 Total Hours 74

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 800 V.D.C. P.C.																									SP
Short R.F. 175 F/100K																									100K
Cap. w. diff. 1000%																									100K
Power factor in %																									100K
LIFE TEST FAILURES IN HRS. 24																									24

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Short R.F. 175 F/100K																									100K
Cap. w. diff. 1000%																									100K
Power factor in %																									100K

Data collected by V. Brown, M. Berger, V.H.W.  
 TUBE DEUTSCHMANN CORPORATION  
 WOODBRIDGE DIST. C.L. 1002  
 WOODBRIDGE, MASS

# LIFE TEST RECORD

UNITS 1 AFD 2X.5 MILU MYLAR C CAPACITORS LOT NO. NUH3R 137  
 SPECIFICATION EXPERIMENTAL FOR WHOM V.H. WINTH CONTRACT NO. NUH3R 57200  
 HOURS ON TEST 72+ TEMPERATURE 125.00 VOLTAGE 900 V.D.C.  
 Date started Clock # 11 2466 Date finished Clock # 11 2542  
 15 - W.D. - 54 Total Hours 76

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 90000 P.C.																									
Cap. in 1000's 1000's	1.12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Power Factor %	48	20	42	39	36	31	42	41	51	42	39	41	45	45	45	39	41	42	46	48	50	55	49	62	54
LIFE TEST FAILURES IN HRS.	23			1	13	12	47	2	11	10		15	23	9	43		12	10			12	26	13	10	

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Cap. in 1000's 1000's	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Power Factor %	48	20	42	39	36	31	42	41	51	42	39	41	45	45	45	39	41	42	46	48	50	55	49	62	54

1 MFD. 2 x .5 Mil U

Order #	Voltage	Temperature	Number of Units	Failed Before Life	Started On Life	Mechanical Failures	Mylar Failures	\$ Mylar Failures	Lot Material	Margin	Number Open After Life
123	1000 VDC	125° C.	25	1	24	0	7	29%	2 & 3	1/4"	0
124	1200 "	125° C.	25	1	24	0	19	79%	2 & 3	1/4"	0
125	1500 "	125° C.	25	3	22	6	16	100%	2 & 3	1/4"	0
126	800 "	125° C.	25	3	22	1	6	28.5%	2 & 3	1/4"	0
127	900 "	125° C.	25	2	23	1	8	36%	2 & 3	1/4"	0
128	1000 "	125° C.	25	1	24	3	8	38%	2 & 3	1/4"	0
129	600 "	125° C.	25	2	23	0	2	8.7%	2 & 3	1/4"	0
130	800 "	125° C.	25	3	22	1	8	38%	2 & 3	1/4"	0
131	1000 "	125° C.	25	2	23	1	14	64%	2 & 3	1/4"	0
132	600 "	125° C.	25	1	24	1	2	8.7%	2 & 3	1/4"	0
133	800 "	125° C.	25	2	23	2	4	19%	2 & 3	1/4"	0
134	1000 "	125° C.	25	3	22	1	10	47.5%	2 & 3	1/4"	0
135	700 "	125° C.	25	0	25	1	2	8.3%	2 & 3	1/4"	0
136	800 "	125° C.	25	0	25	0	12	48%	2 & 3	1/4"	0
137	900 "	125° C.	25	0	25	0	18	72%	2 & 3	1/4"	0

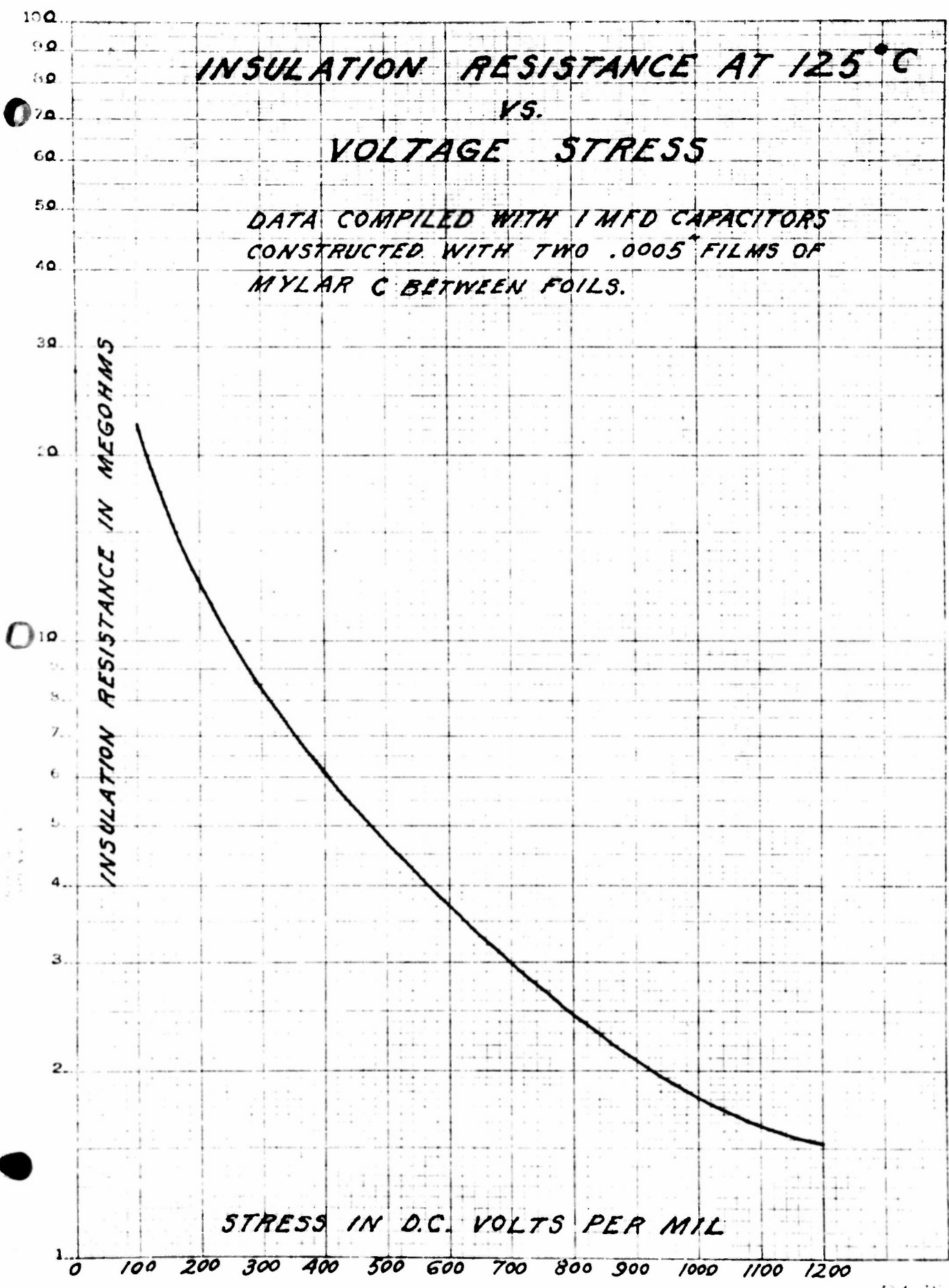
Table I



C-1017

# INSULATION RESISTANCE AT 125°C VS. VOLTAGE STRESS

DATA COMPILED WITH 1 MFD CAPACITORS  
CONSTRUCTED WITH TWO .0005" FILMS OF  
MYLAR C BETWEEN FOILS.



# LIFE TEST RECORD

UNITS .25 WATT SAMPLE 5 MINUTE - METALLIZED MYLAR C CAPACITORS LOT NO. NO 651 M-44  
 SPECIFICATION EXPERIMENTAL FOR WHOM V. H. WINGROTH CONTRACT NO. NO 651 - 57200  
 HOURS ON TEST 260 TEMPERATURE 125°C VOLTAGE 300 V.D.C.  
 Date started 26- MAR-54 Clock # 1 4568 Date finished 26- APR-54 Clock # 1 4823  
 Total Hours 260

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage across P																									
Shunt R - max 0.75F / 100K	2516	2801	2524	2252	2204	2256	2262	2267	2296	2240	2236	2259	2246	2214	2202	2203	2209	2212	2204	2204	2204	2204	2204	2204	2204
Cap. in mfd / 1000/s	2516	2801	2524	2252	2204	2256	2262	2267	2296	2240	2236	2259	2246	2214	2202	2203	2209	2212	2204	2204	2204	2204	2204	2204	2204
Power Factor %	71	49	49	55	42	37	52	52	58	53	56	46	58	54	57	56	58	59	59	59	59	59	59	59	59

## LIFE TEST FAILURES IN HRS.

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R - max 0.75F / 100K																									
(105V)			*																						
Cap. in mfd / 1000/s	2338	2333	223	2322	2267	2345	2279	2364	2356	2229	227	2317	236	2269	2278	235	2302	231	2297	2328	2301	2356	2324	2315	2328
Power Factor %	76.0	74	74	75	75	75	75	76	75	78	55	525	58	59	69	46	47	59	45	42	45	48	44	45	41
Intermittent																									

NObsr M#44

Twenty-five .25 Mfd.  
Single .5 Mil Metallized  
Mylar C Units

The units (25) were wired to a Life Test rack after the initial tests were concluded, and the total capacitance measured at room temperature. Following this, they were heated in an oven to 125° C. for one-half hour. The capacitance was then measured at 125° C.

Next, the units were exposed to 300 V.D.C. pre-breakdown test for one-half hour. During this period, there were ten temporary breakdowns. The capacitance was again measured before the Life Test commenced.

<u>Temporary Breakdowns</u>	<u>Total Capacitance</u>	<u>Elapsed Time</u>
0	6.4 Mfd.	Start of Test
7	6.4 "	24 hours
13	6.4 "	45 "
13	6.4 "	68 "
13	6.4 "	93 "
13	6.1 "	116 "
13	6.1 "	183 "
14	6.1 "	212 "
14	5.9 "	241 "
14	5.9 "	260 "
		Test Completed

NObar M#44 (Continued)

Number of units started on test ..... 25  
Number finished ..... 25  
Total Capacitance before Life Test at room temperature ..... 5.75 Mfd.  
" " " " " " 125° C. .... 6.65 "  
Number of permanent failures ..... 0  
Number of temporary failures ..... 14  
Number of opens at the end of the test ..... 0



# LIFE TEST RECORD

UNITS .25 MFD. SINGLE .5 MIL U - METALLIZED M-LAR C CAPACITORS LOT NO. NOBsr M-45  
 SPECIFICATION EXPERIMENTAL FOR WPM V.H. WIRTH CONTRACT NO. NOBsr-57200  
 HOURS ON TEST 250 TEMPERATURE 125°C VOLTAGE 400 V.D.C.  
 Date started 26-MAR-54 Clock # 2 Date finished 8-APR-54 Clock # 2 - 4692-  
26-MAR-54 Tray # 8-000-54 Total Hours 260

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
VOLTAGE 400V D.C.																									
Short R-Meg 577E/100K																									
Cap. in MFD - 1000/100K																									
Power Factor - %																									
LIFE TEST FAILURES IN HRS.																									

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Short R-Meg 577E/100K																									
Cap. in MFD - 1000/100K																									
Power Factor - %																									

Data collected by M. B. Brown V.H.W.



NObsr M#45

Twenty-five .25 Mfd.  
Single .5 Mil Metallized  
Mylar C Units

The units (25) were wired to a Life Test rack after the initial tests were concluded, and the total capacitance measured at room temperature. Following this, they were heated in an oven to 125° C. for one-half hour. The capacitance was then measured at 125° C.

Next, the units were exposed to 400 V.D.C. pre-breakdown test for one-half hour. During this period, there were no breakdowns. The capacitance was again measured before the Life Test commenced.

<u>Temporary Breakdowns</u>	<u>Total Capacitance</u>	<u>Elapsed Time</u>
0	6.7 Mfd.	Start of Test
5	6.3 "	24 hours
179	6.2 "	45 "
186	6.2 "	68 "
186	6.2 "	93 "
186	6.2 "	116 "
186	6.6 "	188 "
186	6.6 "	212 "
186	6.4 "	241 "
186	6.4 "	260 "

Test Completed

NObsr M#45 (continued)

Number of units started on test .....	25
Number finished .....	25
Total capacitance before Life Test at room temperature....	5.80 Mfd.
"        "        "        "        "        "        125° C. ....	6.70 Mfd.
"        "        after pre-breakdown test .....	6.70 Mfd.
"        "        "        Life Test .....	6.40 Mfd.
Number of permanent failures .....	0
Number of temporary failures .....	186
Number of opens at the end of the test.....	0

S-E-C-U-R-I-T-Y    I-N-F-O-R-M-A-T-I-O-N    R-E-S-T-R-I-C-T-E-D

# LIFE TEST RECORD

UNIT: 125 MFD. SINGLE 5 MIL U - METALLIZED MYLAR C CAPACITORS LOT NO. NO bar M-46  
 SPECIFICATION: EXPERIMENTAL FOR MEM V.H. WINSTON CONTRACT NO. NO bar- 57800  
 HOURS ON TEST: 250 TEMPERATURE: 125°C VOLTAGE: 500 V.D.C.  
 Date started: Clock # 3 3305 Date finished: Clock # 3 3542  
 26- MAR-54 Tray # 8- QM0-54 Total Hours: 257

## ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
VOLTAGE 500V.D.C.	P															P	P								P
Shunt R - Neg Ω at 76°F (105V.D.C.)	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
Cap. 10 MFD - 1000 Ω	2572	258	2517	255	2574	2522	2527	2505	2567	2575	2586	2598	2523	2526	2554	2575	257	2537	2576	2532	2534	2558	2555	2585	2512
Power Factor %	47	41	7	57	57	57	52	7	42	71	33	52	35	44	37	45	4	1.07	1.67	1.75	39	89	44	39	
LIFE TEST FAILURES IN HRS.																									

## ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R - Neg Ω 76°F	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
Cap. 10 MFD - 1000 Ω	2534	2507	2265	2544	2462	2539	2552	2529	2504	227	2326	2571	2352	2505	2504	2122	—	2252	2571	2343	2262	2275	2332	2305	2305
Power Factor %	49	48	44	45	55	47	47	4	48	515	44	58	465	355	465	405	—	44	1.1	53	2.6	53	98	5	47
LIFE TEST FAILURES IN HRS.																									

Data collected by V. B. Boush, V. S. S.

THE ELECTRONIC CORPORATION

1000 W. 12th St. S.E. ALBANY, N.Y. 12206

NObsr M#46

Twenty-five .25 Mfd.  
Single .5 Mil  
Metallized Mylar C  
Units

The units (24) were wired to a Life Test rack after the initial tests were concluded, and the total capacitance measured at room temperature. Following this, they were heated in an oven to 125° C. for one-half hour. The capacitance was then measured at 125° C.

Next, the units were exposed to 500 V. D.C. pre-breakdown test for one-half hour. During this period, there were 39 temporary breakdowns. The capacitance was again measured before the Life Test commenced.

<u>Temporary Breakdowns</u>	<u>Total Capacitors</u>	<u>Elapsed Time</u>
0	6.4 Mfd.	Start of Test
58	6.3 "	24 hours
166	6.15 "	42 "
166	6.15 "	65 "
166	6.15 "	90 "
166	6.15 "	113 "
167	6.20 "	185 "
171	6.20 "	209 "
171	6.15 "	238 "
171	6.15 "	257 "

Test completed

NObsr #46 (continued)

Number of units started on test .....	24
Number finished .....	24
Total capacitance before Life Test at room temperature ....	5.55 Mfd.
" " " " " " 125° C. ....	6.40 Mfd.
" " after pre-breakdown test .....	6.40 Mfd.
" " " Life Test .....	6.15 Mfd.
Number of permanent failures .....	0
Number of temporary failures .....	171
Number of opens at the end of the test .....	0

S-E-C-U-R-I-T-Y

I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D



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